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CHICAGO, IL 60661

EXAMINER

TRAN, NHAN T

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2622

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/527,778	Applicant(s) WOLTERINK ET AL.	
	Examiner Nhan T. Tran	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-8 and 10-33 is/are pending in the application.
- 4a) Of the above claim(s) 17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 10-16 and 18-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicants' arguments, filed 8/6/2007, with respect to claims 1-4, 6-8, 10-13, 16, 18-22, 24-30, 32-33 have been fully considered but they are not persuasive.

The Applicants assert:

(i) Suda bonding process must take place at high temperatures, for example, at least 400 degrees Celsius. In contrast, the Applicants' invention uses cold temperature adhesive systems, such as UV curable resins. Therefore, Suda does not teach bonding by using an adhesive as required in claims 1 & 18 (see remarks, pages 9 & 10).

(ii) Suda does not disclose a construction for a camera device comprising an optical system of at least two lens elements as required in claim 20 (see remarks, pages 10-11).

In response, the Examiner understands the Applicants' arguments but respectfully disagrees with the Applicants' assessments of the teaching of Suda and the claims for the following reasons:

(i) Suda clearly teaches that the adhesive layer is treated by ultraviolet irradiation (UV curable resin) instead of high temperature heating because sufficient heating for hardening the thermally settable epoxy resin may deteriorate color filters, replica portion, microlens, etc. (see paragraph [0137]). Furthermore, since the aperture layer 103 (Fig. 1A in Suda) is made of **Chromium thin film** (see paragraph [0132]), this thin film inherently has adhesive property for adhering the lens substrate (101) and the

spacer (102) as disclosed in paragraph [0119]. *For inherency of adhesive property of Chromium thin film, please see US 5,502,381, col. 3, lines 6-17.* Thus, Suda does teaches adhesive layers (103 and 105) required in claims 1 & 18. It is also noted that the claimed limitations are broader than the Applicants' arguments.

(ii) As seen in Suda, Fig. 40B and paragraphs [0108] & [0297], the camera device has at least two lens elements. The first lens element is 1611 or 1613, and the second lens element is 801 or 803. Please note that the aperture layer 506 in Fig. 40B is also considered as an adhesive layer made of Chromium thin film as discussed above.

In view of the above, Suda has met the claimed limitations of the above mentioned claims.

2. Applicant's arguments with respect to claims 14, 23 & 31 have been considered but are moot in view of the new ground of rejection necessitated by the amendment.

Specification

3. The specification is objected to because of the informality as set in the previous Office Action mailed 5/2/2007.

Claim Objections

4. Claim 1 is objected to because of the recitation of "wherein said spacer substrate is adhered to said image capturing element by means of **the** adhesive layer, and said

lens substrate is adhered to said spacer substrate by means of **the** adhesive layer."

Since there are two different adhesive layers in the antecedent basis of this claim, these limitations are suggested to be corrected to read as -- wherein said spacer substrate is adhered to said image capturing element by means of **one of the** adhesive layers, and said lens substrate is adhered to said spacer substrate by means of **the other of the** adhesive layers. --. In an alternative suggestion, "*adhesive layers*" should be clarified to distinguish between a first adhesive layer and a second adhesive layer for the independent claims and corresponding dependent claims.

Claim 2 is also objected to because of the recitation of "a projection of **the** hole" which should be corrected to read as -- a projection of **a** hole --.

Claim 24 is also objected to because of the recitation of "the second spacer substrate" which should be corrected to read as -- a second spacer substrate --.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 7, 8, 10-13, 18-22, 24-26 & 28-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Suda et al. (US 2004/0012698).

Regarding claim 1, Suda discloses a camera device (Figs. 1A-B & 56 and [0373]) comprising an image capturing element (104 in Fig. 1A), a lens substrate (101) a lens element (100), wherein said lens element projects an object on the image capturing element, a spacer (102 in Fig. 1A) located between the lens substrate and the image capturing element, wherein the spacer comprises one or more adhesive layers (105 and 103) and a spacer substrate (substrate 102) for maintaining a predetermined distance between the lens substrate (101) and the image capturing element (104), wherein said spacer substrate is adhered to said image capturing element by means of the adhesive layer (105), and said lens substrate is adhered to said spacer substrate by means of the adhesive layer (103) (see Figs. 1A, [0119], [0132] and [0137], wherein the layer 103 is made of Chromium thin film which acts as an adhesive layer by inherency as discussed in the Examiner's response above).

Regarding claim 2, Suda also discloses that the adhesive layer (105) has the shape of a rim (Fig. 2C) outside a projection of a hole on the spacer means coaxially positioned relative to a main optical axis of the lens element.

Regarding claim 3, it is clear that the adhesive layer comprises an ultra-violet curing resin (see [0137]).

Regarding claim 4, also disclosed by Suda is that the adhesive layer comprises a thermo-hardening resin (see [0137]).

Regarding claim 7, it is also seen in Fig. 1A of Suda that the spacer means further comprises a cover substrate (substrate 101 which covers the spacer 102).

Regarding claim 8, in another configuration in Fig. 40B, Suda further teaches that the cover substrate (501 in Fig. 40B) comprises a second lens (801) substrate having a second lens element (801) for projecting an object on the image capturing element, the main optical axis of the lens element coinciding with the main optical axis of the second lens element (see Fig. 40B and [0295]-[0298]).

Regarding claim 10, it is also clearly seen in Fig. 1A that the adhesive layer (103) is located between the spacer substrate (102) and the cover substrate (101).

Regarding claim 11, Suda further discloses that the lens element is of replication type (see Figs. 5, 7-8 for the lens element being replicated to form a same type of lens to make a plurality of lens elements).

Regarding claim 12, as shown in Fig. 1A, the lens (100) is formed as a convexity in the lens substrate.

Regarding claim 13, as shown in Figs. 26B & 40B, the lens (601 or 603) is formed as a concavity in the lens substrate.

Regarding claim 18, Suda discloses a wafer scale package (Figs. 7 & 31) comprising a base substrate (110) having a plurality of image capturing elements (111 and details shown in Fig. 1A), wherein the package further comprises a lens substrate (117 in Fig. 8) having a plurality of lens elements (100) associated with respective image capturing elements (photosensor array 104 in Fig. 1A), and a spacer (114 in Fig. 8 or 102 in Fig. 1A) for maintaining a predetermined distance between the lens substrate and the base substrate, whereby the position of the lens substrate relative to the base substrate is fixated by means of an adhesive layer (103, note the analysis of claim 1) securing said lens substrate to said spacer substrate, and another adhesive layer (105) securing said spacer substrate to said base substrate. See Fig. 8, [0152]-[0158], [0119] and [0132] and note the analysis of claim 1.

Regarding claim 19, Suda also discloses an optical assembly (Figs. 7 & 8) for use in a process for manufacturing a camera device according to claim 1, wherein the optical assembly comprises a lens substrate (117) having a plurality of lens elements (100). See [0152]-[0158].

Regarding claim 20, Suda discloses a camera device (Figs. 40B & 56 and [0373]) comprising an image capturing element (pixel sensor in 503, see [0300]), a first lens substrate (1611) for carrying a first lens element (1611), wherein said first lens element projects an object on the image capturing element, a spacer (502) located between the first lens substrate and the image capturing element, wherein the spacer comprises one or more adhesive layers (509, 506) and a spacer substrate (502) for maintaining a predetermined distance between the first lens substrate and the image capturing element, wherein said spacer substrate is adhered to said image capturing element by means of an adhesive layer (509; see [0295]), wherein a second lens substrate (801) for carrying a second lens element (801) is stacked on said first lens substrate, aligned along the main optical axis through the second lens element, first lens element, spacer substrate and the image capturing element (see Fig. 40B and [0295]-[0298]).

Regarding claim 21, Suda disclose that an adhesive layer (layer 506 in Fig. 40B which is equivalent to layer 102 in Fig. 1A, wherein such layer is made of Chromium thin film inherently having adhesive property as discussed in claim 1) is present between the second lens substrate (801) and the first lens substrate (1611).

Regarding claim 22, also disclosed by Suda is that said second lens substrate further comprises a second spacer substrate (501 in Fig. 40B), wherein said second

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spacer substrate is adhered to said first lens substrate (1611) through an adhesive layer (506).

Regarding claim 24, it is clear in Figs. 41 & 42 that the adhesive layer (506, 509) has the shape of a rim outside a projection of the hole on [the] second spacer substrate coaxially positioned relative to a main optical axis of the second lens element (801).

Regarding claims 25 & 26, these claims are also met by the analyses of claims 3 & 4, respectively.

Regarding claims 28-30, these claims are also met by the analyses of claims 11-13, respectively.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6, 16, 27 & 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda et al. (US 2004/0012698) in view of Broome et al. (US 6,072,634).

Regarding claim 6, Suda teaches that a spacer substrate (522 in Fig. 26B or 222 in Fig. 47) comprises a hole (a hole to contain the photosensor and microlens array 516 and to allow incident light to reach into the photosensor) coaxially positioned relative to a main optical axis of the lens element. Although Suda is silent as to the side of the hole is provided with an anti-reflection layer, such anti-reflection layer is well known in the art as taught by Broome. Fig. 1 of Broome shows a lens spacer (150) which is made by *opaque black material*, wherein the side surface of spacer hole (e.g., internal surface) is either diffused or has micro grooves to prevent specular reflection of light into the rest of the lens system, thereby stray light is suppressed and aliasing effects are eliminated (see Broome, col. 5, lines 55-58 and col. 1, lines 9-11).

Therefore, it would have been obvious to one of ordinary skill in the art to configure the spacer substrate in Suda to provide an anti-reflection layer on a side of a hole of the spacer so that stray light would be suppressed and aliasing effects would be eliminated to enhance image quality as taught by Broome.

Regarding claim 16, although Suda teaches that the lens substrate (101) is provided with aperture layer (103) as shown in Figs. 1A & 1B but Suda is silent about that the aperture has an anti-reflection layer.

However, it is well recognized by Broome that the aperture (150) is provided with an anti-reflection layer as analyzed in claim 6 to suppress stray light and eliminate aliasing effects.

Therefore, it would have been obvious to one of ordinary skill in the art to provide an anti-reflection layer on the aperture of the lens substrate in Suda so that stray light would be suppressed and aliasing effects would be eliminated to enhance image quality as taught by Broome.

Regarding claims 27 & 33, these claims are also met by the analyses of claims 6 & 16, respectively.

7. Claims 14 & 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda et al. (US 2004/0012698) in view of Murano et al. (US 5,617,131).

Regarding claim 14, although Suda is silent as to the lens substrate is provided with a through hole whereby the lens element is located within the through hole, such lack of teaching is compensated by Murano. Murano teaches an alternative configuration for forming lens array, in which each lens element (52 in Fig. 9) is formed within a through hole of each lens substrate (56) so as to prevent stress against the lens element under thermal expansion, thereby improving focusing characteristics of the lens (see Murano, Fig. 9 and col. 9, lines 20-30).

Therefore, it would have been obvious to one of ordinary skill in the art to provide the lens substrate in Suda with a through hole whereby the lens element is located within the through hole so as to prevent stress against the lens element under thermal

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expansion, thereby improving focusing characteristics of the lens as suggested by Murano.

Regarding claim 31, this claim is also met by the analysis of claim 14.

8. Claims 15, 23 & 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda et al. (US 2004/0012698).

Regarding claim 15, although Suda does not explicitly disclose an infrared-red reflecting layer provided on the lens substrate in the embodiment of Figs. 1A & 1B, Suda suggests in another embodiment of Fig. 26B that an infrared cut-off filter (560) provided on a lens substrate (550) (see [0239]). Such the infrared-red cut-off layer is advantageous in that it prevents infrared light from impinging onto the photosensors, thereby enhancing image quality.

Therefore, it would have been obvious to one of ordinary skill in the art to provide an infrared-red reflecting layer on the lens substrate for preventing infrared light from impinging onto the photosensors, thereby enhancing image quality.

Regarding claim 32, this claim is also met by the analysis of claim 15.

Regarding claim 23, although Suda does not explicitly disclose that the second lens substrate (801) is adhered to said second spacer (501) through an adhesive layer,

such adhesive layer is obvious to one skilled in the art for adhering the lens substrate to the second spacer substrate by a plurality of techniques so that the second lens is securely and precisely attached to the second spacer. Therefore, it would have been obvious to one of ordinary skill in the art to adhere the second lens substrate to said second spacer substrate through an adhesive layer so that the second lens is securely and precisely attached to the second spacer for focusing the incident light into the photosensors.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Friday, 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



NHAN T. TRAN
Patent Examiner